

2015 Monitoring Summary



Clear Creek at Choctaw County Road 32 (32.23648\ -88.19938)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the Clear Creek watershed for biological and water quality monitoring as part of the 2015 Assessment of the Tombigbee River Basin. The objectives of statewide Basin Assessments were to assess the biological integrity of each monitoring site and to estimate overall water quality within the basins.

Clear Creek at CLEC-1 is among the least-disturbed watersheds in the Tombigbee basin based on landuse, road density, and population density and is an ecoreference candidate station. The 2015 data will be used to evaluate Clear Creek as a best attainable condition reference watershed for comparison with other stations in the same ecoregion.



Figure 1. Clear Creek at CLEC -1, May 6, 2015.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Clear Creek is designated as a *Fish & Wildlife (F&W)* stream. Clear Creek is a low gradient stream that drains a 31 square mile watershed through Choctaw County in the Southern Hilly Gulf Coastal Plain ecoregion (65d). Based on the 2011 National Land Cover Dataset, land use within the watershed is composed of mostly forest (63%). As of April 1, 2016, only 1 permit has been issued in this watershed.

REACH CHARACTERISTICS

General observations (Table 2) and a habitat assessment (Table 3) were completed during the macroinvertebrate community assessment. In comparison with reference reaches in the same ecoregion, they give an indication of the physical condition of the site and the quality and availability of habitat. Bottom substrate in Clear Creek at CLEC-1 is characterized by sand and silt (Figure 1). Overall habitat quality was rated as *marginal* for supporting a healthy macroinvertebrate community.

BIOASSESSMENT RESULTS

The benthic macroinvertebrate community was sampled using ADEM's Intensive Multi-habitat Bioassessment methodology (WMB-I). Measures of taxonomic richness, community composition, and community tolerance were used to assess the overall health of the macroinvertebrate community in comparison to conditions expected in south Alabama streams and rivers. Each site is placed in one of six levels, ranging from 1, or *natural*, to 6, or *highly altered*. The macroinvertebrate survey conducted at CLEC-1 rated the site as a 3-, or *good-fair*. (Table 4)

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Tombigbee River
Drainage Area (mi ²)		31
Ecoregion ^a		65D
% Landuse ^b		
Open water		<1%
Wetland	Woody	5%
	Emergent herbaceous	<1%
Forest	Deciduous	23%
	Evergreen	25%
	Mixed	15%
Shrub/scrub		16%
Grassland/herbaceous		11%
Pasture/hay		2%
Cultivated crops		<1%
Development	Open space	2%
	Low intensity	<1%
	Moderate intensity	<1%
Population/km ^{2c}		3
# NPDES Permits ^d	TOTAL	1
	Construction	1

a. Southern Hilly Gulf Coastal Plain

b. 2011 National Land Cover Dataset

c. 2010 US Census

d. #NPDES outfalls downloaded from ADEM's NPDES Management System database, April 1, 2016.

Table 2. Physical characteristics of Clear Creek at CLEC-1, May 6, 2015.

Physical Characteristics	
Width (ft)	19
Canopy Cover	Mostly Shaded
Depth (ft)	
Run	2.0
Pool	5.0
% of Reach	
Run	50
Pool	50
% Substrate	
Mud/Muck	1
Sand	85
Silt	10
Organic Matter	4

Table 3. Results of the habitat assessment conducted on Clear Creek at CLEC-1, May 6, 2015.

Habitat Assessment	% Maximum Score	Rating
Instream Habitat Quality	33	Marginal (31-<55)
Sediment Deposition	55	Sub-Optimal (55-79)
Sinuosity	55	Sub-Optimal (55-79)
Bank Vegetative Stability	44	Marginal (31-<58)
Riparian Buffer	43	Marginal (31-<60)
Habitat Assessment Score	77	
% of Maximum Score	45	Marginal (31-<57)

Table 4. Results of the macroinvertebrate bioassessment conducted in Clear Creek at CLEC-1, May 6, 2015.

Macroinvertebrate Assessment		Results
Taxa richness and diversity measures		
	Total # Taxa	58
	# EPT taxa	16
	# Highly-sensitive and Specialized Taxa	1
Taxonomic composition measures		
	% EPC taxa	36
	% EPT minus Baetidae and Hydropsychidae	13
	% Chironomidae Individuals	57.6
	% Dominant Taxon	24
	% Individuals in Dominant 5 Taxa	47
Functional feeding group		
	# Collector Taxa	24
	% Tolerant Filterer Taxa	9
Community tolerance		
	# Sensitive EPT	6
	% Sensitive taxa	24
	% Nutrient Tolerant individuals	13
	WMB-I Assessment Score	3-
	WMB-I Assessment Rating	Good-Fair

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. *In situ* measurements and water samples were collected monthly, and semi-monthly (metals) from March through October of 2015, to help identify any stressors to the biological communities. Median values for specific conductance and total aluminum were higher than expected based on median values of reference reaches within ecoregion 65d. On April 15, 2015 and October 26, 2015, the summer single sample criteria for *E. coli* (F&W) was exceeded.

SUMMARY

Clear Creek at CLEC-1 was found to be *marginal* in its ability to support healthy and diverse macroinvertebrate communities. The overall macroinvertebrate community condition was rated as *good-fair*. Specific conductivity and total aluminum values were above expected levels for ecoregion 65d. The summer single sample criteria for *E. coli* was exceeded on two sampling events.

Table 5. Summary of water quality data collected March – October, 2015. Minimum (Min) and maximum (Max) values calculated using minimum detection limits (MDL). Median, average (Avg), and standard deviations (SD) values were calculated by multiplying the MDL by 0.5 when results were less than this value.

Parameter	N	Min	Max	Med	Avg	SD	Q
Physical							
Temperature (°C)	8	14.8	22.9	20.0	19.9	2.7	
Turbidity (NTU)	9	9.3	38.1	14.7	17.3	8.8	
Total Dissolved Solids (mg/L)	8	51.0	90.0	75.0	72.1	13.1	
Total Suspended Solids (mg/L)	8	4.0	26.0	8.0	10.9	7.7	
Specific Conductance (µmhos/cm)	8	46.3	92.9	74.1 ^G	73.7	16.3	
Hardness (mg/L)	4	15.6	26.8	22.8	22.0	4.8	
Alkalinity (mg/L)	8	9.9	37.2	27.6	25.6	10.0	
Monthly Stream Flow (cfs)	9	1.5	52.6	6.7	14.9	16.7	
Measured Stream Flow (cfs)	9	1.5	52.6	6.7	14.9	16.7	
Chemical							
Dissolved Oxygen (mg/L)	8	6.6	9.6	8.1	8.1	1.0	
pH (SU)	8	6.0	7.0	6.6	6.6	0.3	
Ammonia Nitrogen (mg/L)	8	< 0.010	0.257	0.020	0.079	0.105	
Nitrate+Nitrite Nitrogen (mg/L)	8	0.002	0.131	0.036	0.048	0.042	
Total Kjeldahl Nitrogen (mg/L)	8	< 0.064	0.780	0.398	0.396	0.291	
Total Nitrogen (mg/L)	8	< 0.072	0.813	0.504	0.443	0.284	
Dis Reactive Phosphorus (mg/L)	8	0.007	0.010	0.008	0.008	0.001	
Total Phosphorus (mg/L)	8	0.023	0.039	0.030	0.030	0.005	
CBOD-5 (mg/L)	8	< 2.0	< 2.0	1.0	1.0	0.0	
COD (mg/L)	6	7.4	32.4	20.2	19.1	8.7	
TOC (mg/L)	8	3.0	10.6	5.8	6.2	2.6	
Chlorides (mg/L)	8	2.3	3.3	2.8	2.8	0.4	
Total Metals							
Aluminum (mg/L)	4	0.135	1.660	0.793 ^M	0.845	0.687	
Iron (mg/L)	4	1.310	2.710	2.195	2.102	0.665	
Manganese (mg/L)	4	0.056	0.112	0.074	0.079	0.024	
Dissolved Metals							
Aluminum (mg/L)	4	< 0.106	0.509	0.053	0.167	0.228	
Antimony (µg/L)	4	< 0.342	< 0.342	0.171	0.171	0.000	
Arsenic (µg/L)	4	0.373	0.582 ^H	0.520	0.498	0.089	4
Cadmium (µg/L)	4	< 0.311	< 0.311	0.156	0.156	0.000	
Chromium (µg/L)	4	0.382	1.000	0.466	0.579	0.292	
Copper (µg/L)	4	< 0.218	1.075	0.625	0.608	0.395	
Iron (mg/L)	4	0.757	1.110	0.910	0.922	0.145	
Lead (µg/L)	4	< 0.428	0.481 ^S	0.214	0.281	0.134	1
Manganese (mg/L)	4	0.026	0.103	0.050	0.058	0.035	
Nickel (µg/L)	4	0.644	1.573	0.880	0.994	0.403	
Selenium (µg/L)	4	< 0.395	< 0.395	0.198	0.198	0.000	
Silver (µg/L)	4	< 0.365	< 0.365	0.182	0.182	0.000	
Thallium (µg/L)	4	< 0.514	< 0.514	0.257	0.257	0.000	
Zinc (µg/L)	4	0.809	4.512	4.112	3.386	1.736	
Biological							
Chlorophyll a (mg/m ³)	8	< 0.10	4.80	0.50	1.00	1.57	
<i>E. coli</i> (MPN/DL)	8	98.7	816.4 ^H	371.0	407.0	294.5	

E=#samples that exceed criterion; G=value higher than median concentration of all verified ecoregional reference reach data collected in the ecoregion 65d; H=F&W Human Health criterion exceeded; J=estimate; M=value >90% of all verified ecoregional reference reach data collected in the ecoregion 65d; N=# of samples; Q=uncertain exceedence; S=F&W hardness-adjusted aquatic life use criterion violated.

FOR MORE INFORMATION, CONTACT:

Aaron Goar, ADEM Aquatic Assessment Unit
1350 Coliseum Boulevard Montgomery, AL 36110
(334) 260-2755 agoar@adem.alabama.gov